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The Examiner requested restriction between the claims of Group I (Claims 1-12) drawn to a copper foil laminate and classified in Class 428, subclass 604; the claims of Group II (Claims 13-17 and 21-28) drawn to a method for increasing the peel strength of a copper foil laminate and classified in Class 205, subclass 333; and the claims of Group III (Claims 18-20) drawn to a treated copper foil and classified in Class 428, subclass 621. During a telephone conversation with the Examiner on December 14, 2004, Applicants' attorney made a provisional election to prosecute the claims of Group I, Claims 1-12. Applicants hereby reaffirm that election and traverse as follows.

Applicants' invention, as embodied in Claim 1, is drawn to a peel strength enhancing layer for a copper or copper alloy foil. As best shown in Applicants' Figure 3a, the peel strength enhancing layer 64 is disposed between a copper or copper alloy substrate 60 and a dielectric substrate 62. As disclosed in Applicants' specification at page 8, lines 241-248, the peel strength enhancing layer is a mixture of a metal and metal oxide where an amount of oxygen in the metal oxide is maximized. Referring to the claims of Group II, to form a metal/metal oxide combination by electroplating, would require oxyanions of the subject metal as claimed in Applicants' Claim 13. Accordingly, the copper foil laminate and the method of manufacture are so interrelated that they may be properly evaluated at the same time.

Applicants' Claim 5 is drawn to the copper foil of Claim 1 with the addition of a silane coating layer. Applicants' Group III claims, as embodied in Claim 18, are drawn to an adhesion promoting layer that is subsequently treated with silane. As Groups I and III are so interrelated with a post-deposition silane treatment, the two groups may properly be evaluated at the same time.

Applicants have demonstrated the interrelationship between Groups I, II and III. Accordingly, it is not believed that the Examiner will be unduly burdened by considering all groups at the same time and evaluating all pending claims on their merits. It is respectfully requested that the restriction requirement be removed and all claims fully examined.

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In the event that the Examiner repeats the restriction requirement and makes its final, Applicants affirm the election of Group I, Claims 1-12. Applicants have identified the preliminary status of Claims 13-28 as "withdrawn."

Applicants' invention, as embodied in Claim I as amended, is drawn to a copper foil for lamination to a dielectric substrate. As disclosed in Applicants' specification at page 1, line 10, this peel strength enhancement increases the adhesion of the copper foil to a dielectric substrate in the manufacture of printed circuit boards.

While a "release layer" is frequently utilized in the manufacture of a printed circuit board, the function of a release layer is not analogous to the function of a peel strength enhancing layer. More particularly, when a thin metallic foil is to be laminated to a dielectric substrate, the foil is frequently formed by deposition onto a metallic carrier layer. Since the thin metallic foil must be peelable from the metallic carrier at a subsequent step in the forming of the printed circuit board, a release layer is disposed between the metallic carrier and the thin metal foil to facilitate removal. The side of the thin metallic foil opposite the metal carrier layer is then contacted to a dielectric substrate. It is desirable for the thin metallic foil layer to adhere as strongly as possible to the dielectric substrate and a "peel strength enhancement" is deposited between the metallic foil and the dielectric substrate. Thus, prior to removal of the metal carrier, a five layer composite --- metal carrier/release layer/thin metallic foil/peel strength enhancement/dielectric substrate --- exists. The metal carrier is then separated from the metallic foil with removal facilitated by poor adhesion between the metallic foil and the metal carrier due to the release layer and also facilitated by enhanced adhesion between the metallic foil and the dielectric substrate due to the peel strength enhancement.

As described more fully herein below, the cited references drawn to a release layer do not teach or suggest the peel strength enhancement claimed by Applicants and Applicants' claims 1-12 should be allowed over the cited references.

Applicants' claims 1-3 were rejected under 35 U.S.C. 102(b) as anticipated by Wang, et al. (US 6447929). The Wang, et al. reference discloses a release layer 49 disposed between a copper foil 12 and a copper layer 69. The release layer is on the order of 1,000 angstroms thick and maybe chromium if electrolytically deposited. The chromium is disclosed as deposited from a chromic acid electrolyte. It is also disclosed to form a chromium oxide release layer that may be spray deposited. There is nothing in the

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Wang, et al. reference to teach or suggest anything other than a release layer. More particularly, there is nothing in the Wang, et al. reference to teach or suggest a peel strength enhancement coating to be disposed between a copper foil and a dielectric substrate to enhance the peel strength where the peel strength enhancement is a mixture of a metal and metal oxide and the amount of oxygen in the metal oxide is maximized.

Claims 1-5 and 6-11 were rejected under 35 U.S.C. 102(b) as anticipated by Chen, et al. (US 6346335). Chen, et al. disclose a release layer 16 disposed between a wrought metal carrier layer 12 and a metal foil 14. The release layer is an admixture of a metal and metal oxide with a thickness on the order of 10 to 300 angstroms. There is nothing in Chen, et al. to teach or suggest a peel strength enhancement to be disposed between a metallic foil and a dielectric substrate. Applicants' claims should be allowed over the Chen, et al. reference.

Claims 6-12 were rejected under 35 U.S.C. 103(a) as unpatentable over Chen, et al. in view of Lin, et al. (US 5071520). The Chen, et al. reference has been described above. The Lin, et al. reference discloses that the adhesion of a copper foil to a substrate, such as a dielectric substrate, may be enhanced by a silane treatment. Prior to the silane treatment, the copper foil is subjected to one of several anti-tarnish treatments. There is nothing in the combination of the Chen, et al. reference and the Lin, et al. reference to teach or suggest enhancing the peel strength of a copper foil to a dielectric substrate by depositing a peel strength enhancement coating that is a mixture of a metal and a metal oxide where the amount of oxygen and the metal oxide is maximized followed by a silane coating. Applicant's Claim 6-12 should be allowed over the combination of Chen, et al. and Lin, et al.

Claims 1-4 and 6-11 were rejected under the judicially created doctrine of obviousness type double patenting as unpatentable over claims 1-6 of US Patent No. 6346335. Applicants respectfully traverse the double patenting rejection. Applicants' claims 1 and 6 are drawn to a structure having a copper foil layer, a peel strength enhancement layer and, in the case of Claim 6, a dielectric substrate. The peel strength enhancement layer is disposed between the copper foil layer and the dielectric substrate to increase the peel strength. The independent claims of US 6346335 are drawn to a composite structure having a support layer that, in accordance with US 6346335 at column 3, line 43 is an electrically conductive metal, a metal foil layer and a release layer disposed

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between the two metallic layers. The US6346335 structure differs in both materials and structure from what is claimed by the Applicants. Applicants' claimed structure has a copper foil layer, a dielectric substrate and a peel strength enhancement layer disposed between the copper foil layer and the dielectric substrate.

Removal of the double patenting rejection is respectfully solicited. However, Applicants are prepared to file a terminal disclaimer should the Examiner repeat the double patenting rejection.


Accordingly, Applicants submit that none of the references, alone or in combination, anticipate or make obvious the invention as presently claimed and that the application is now in condition for allowance. Therefore, Applicants respectfully request reconsideration and further examination of the application and the Examiner is respectfully requested to take such proper actions so that a patent will issue herefrom as soon as possible.

If the Examiner has any questions or believes that a discussion with Applicants' attorney would expedite prosecution, the Examiner is invited and encouraged to contact the undersigned at the telephone number below.

Please apply any credits or charge any deficiencies to our Deposit Account No. 23-1665.

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Respectfully submitted,
William L. Brenneman, ET. AL.



Signature of Attorney
Gregory S. Rosenblatt
WIGGIN & DANA LLP
One Century Tower
New Haven, CT 06508-1832
Telephone: (203) 498-4566
Facsimile: (203) 782-2889

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